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EXAMINER	
BIRENBAUM, NIRA S	
ART UNIT	**PAPER NUMBER**
1742	

DATE MAILED: 07/27/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/660,450	Applicant(s) SMEDLEY ET AL.	
	Examiner Nira S. Birenbaum, Ph.D.	Art Unit 1742	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on *13 June 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-35* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-35* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *2-23-2004*.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

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DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Siu *et al.* (US Patent No. 5,958,210).

Siu teaches a method for operating an electrolyzer for producing metal particles. Regarding claim 1, the electrolyzer has an anode (**46**) and cathode (particle bed, see Figure 1b), and the electrode surfaces are at least partially immersed in an electrolyte solution containing dissolved zinc (column 4, lines 17-24). The method comprises:
--determining an operating range for the cell voltage (see column 4, lines 63-66. Although the step of determining the voltage range is not expressly recited, it would be obvious that this step was carried out because an optimal voltage range is taught.)
--applying a current between the anode and cathode (see column 7, lines 8-9.
--forming metal particles on the cathode by electrolysis of the dissolved metal (see column 8, lines 11-21).

However, the reference does not expressly teach applying the current to create a cell voltage within the operating range, or adjusting the current to maintain the voltage within this operating range. It would have been obvious to one of ordinary skill in the art

at the time of the invention to apply a current such that the cell voltage would be within the predetermined range and to adjust the current so that the voltage remains within this range, because Siu teaches that the predetermined range is optimal for operating of the cell (see column 4, lines 63-66).

Regarding claims 2 and 7-8, it would have been obvious to one of ordinary skill in the art at the time of the invention to optimize the current density of the electrolytic cell, because Siu teaches that the current density is a result-effective variable (column 7, lines 36-39). See MPEP 2144.05 IIB.

Regarding claims 3 and 5, Siu teaches that the dissolved metal is in the form of zinc oxide (column 4, lines 23-24).

Regarding claim 4, Siu teaches that zinc-air batteries use an alkaline electrolyte (column 1, lines 31-33), and the solution used in the electrolysis is an alkaline zinc solution (column 4, lines 17-24).

Regarding claim 6, it would have been obvious to one of ordinary skill in the art at the time of the invention to further optimize the cell voltage because Siu teaches that the cell voltage is a result-effective variable (see column 7, lines 9-11) See MPEP 2144.05 IIB.

Claims 9-12 and 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Goldstein *et al.* (US Patent No. 5,228,958) in view of Brytczuk *et al.* (US Patent No. 3,864,227), evidenced by Anderson *et al.* (US Patent No. 4,430,178).

Regarding claims 9 and 10, Goldstein teaches a method for electrowinning zinc comprising:

-- immersing an electrolyzer having an anode and a cathode into an electrolyte containing a dissolved metal (see column 2, lines 55-66)

--applying DC voltage to the electrolyzer to produce metal particles on the cathode (see column 2, lines 55-66)

--removing the metal particles from the electrolyzer when the particles reach a desired size (see column 2, lines 67-68).

However, this reference does not teach reducing the applied voltage and reversing the polarity of the voltage.

Brytczuk teaches a method for electrowinning copper in which both forward and reverse current flow is used. The current density is reduced for the reverse step (see column 3, lines 28-32), and the forward and reverse steps are repeated continuously (see column 3, lines 15-20).

It would have been obvious to one ordinary skill in the art at the time of the invention to modify the method of Goldstein by incorporating a reverse-flow current step with a lower current density as disclosed by Brytczuk, because Brytczuk teaches that during the reverse current flow, the cathode anodizes and allows for easier removal of the deposited copper (see column 4, lines 1-5).

The examiner would like to note that although Brytczuk does not explicitly teach deceasing the applied voltage, this would be inherent because the current density is proportional to the applied voltage. Furthermore, the specific value of 1.65 volts is not given patentable weight, because the applied voltage is a result-effective variable and it would have been obvious to one of ordinary skill in the art to optimize this value for the

specific parameters of the invention. See MPEP 2144.05 IIB. In addition, while Brytczuk does not explicitly teach that the reversed current flow dissolves unremoved metal from the cathode surface, it is well known in the art of electroplating/electrowinning that reversing the current in a deposition process causes dissolution of the deposited metal. See, for example, Anderson *et al.* column 1, lines 22-24.

Regarding claims 11 and 12, Brytczuk teaches that the time periods for both the forward and reverse current flow are result-effective variables (see column 3, lines 36-44 and column 6, lines 5-13). It would have been obvious to one of ordinary skill in the art at the time of the invention to optimize the time period of the reverse current flow in order to meet the requirements of the present invention. See MPEP 2144.05 IIB.

Regarding claims 18 and 20, Goldstein teaches that the dissolved metal is zinc oxide (column 2, lines 27-29).

Regarding claim 19, Goldstein teaches that the electrolyte solution is the product of a discharged zinc-air battery (column 2, lines 22-24).

Claims 13-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Goldstein *et al.* in view of Brytczuk *et al.* and Anderson *et al.* as applied to claim 9 above, and further in view of Siu *et al.*

Goldstein, Brtyczuk, and Anderson teach the features as described above. However, regarding claim 13, these references do not teach determining an operating range for the cell voltage or monitoring and adjusting the voltage to maintain it within the operating range.

Siu teaches a zinc electrowinning method in which an operating range for the cell voltage is disclosed. (See column 4, lines 63-66. Although the step of determining the voltage range is not expressly recited, it is obvious that this step was carried out because an optimal voltage range is taught.) It would have been obvious to one of ordinary skill in the art at the time of the invention to determine an operating range for the cell voltage as disclosed by Siu, because Siu teaches that the predetermined range is optimal for operating of the cell (see column 4, lines 63-66). Furthermore, it would have been obvious to monitor the cell voltage and to adjust the voltage so that it remains within this predetermined range, since that range is optimal for operating the cell.

Regarding claims 14 and 16-17, Goldstein in view of Brytczuk does not teach the claimed current densities in the cell. However, it would have been obvious to one of ordinary skill in the art at the time of the invention to optimize the current density of the electrolytic cell, because Siu teaches that the current density is a result-effective variable (column 7, lines 36-39). See MPEP 2144.05 IIB.

Regarding claim 15, Goldstein in view of Brytczuk does not teach limiting the cell voltage to within 20% of the optimal voltage. However, it would have been obvious to one of ordinary skill in the art at the time of the invention to further optimize the cell voltage because Siu teaches that the cell voltage is a result-effective variable (see column 7, lines 9-11) See MPEP 2144.05 IIB.

Claims 21, 28-30 and 32-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Goldstein *et al.* (US Patent No. 5,228,958) in view of Brytczuk *et al.* (US Patent No. 3,864,227), evidenced by Anderson *et al.* (US Patent No. 4,430,178).

Regarding claim 21, Goldstein teaches a method for electrowinning zinc comprising:

-- immersing an electrolyzer having an anode and a cathode into an electrolyte containing a dissolved metal (see column 2, lines 55-66)

--applying a voltage to the electrolyzer to produce metal particles on the cathode (see column 2, lines 55-66)

--removing the metal particles from the electrolyzer when the particles reach a desired size (see column 2, lines 67-68).

However, this reference does not teach reducing the applied voltage and reversing the polarity of the voltage.

Brytczuk teaches a method for electrowinning copper in which both forward and reverse current flow is used. The current density is reduced for the reverse step (see column 3, lines 28-32).

It would have been obvious to one ordinary skill in the art at the time of the invention to modify the method of Goldstein by incorporating a reverse-flow current step with a lower current density as disclosed by Brytczuk, because Brytczuk teaches that during the reverse current flow, the cathode anodizes and allows for easier removal of the deposited copper (see column 4, lines 1-5).

The examiner would like to note that although Brytczuk does not explicitly teach deceasing the applied voltage, this is inherent because the current density is proportional to the applied voltage. Furthermore, Brytczuk teaches that the current density is reduced by 65% in the reverse step, which would be sufficient to prevent oxygen evolution on the cathode. In addition, while Brytczuk does not explicitly teach that the reversed current flow dissolves unremoved metal from the cathode surface, it is well known in the art of electroplating/electrowinning that reversing the current in a deposition process causes dissolution of the deposited metal. See, for example, Anderson *et al.* column 1, lines 22-24.

Goldstein also does not teach monitoring the cell voltage and adjusting the current to maintain the voltage within a predetermined range. However, it would have been obvious to one of ordinary skill in the art at the time of the invention to carry out these steps, in order to keep the cell within optimal operating parameters.

Regarding claim 28, Goldstein does not teach repeating the forward and reverse current steps. However, Brytczuk teaches that cycle of forward and reverse current flow can be repeated multiple times (column 3, lines 15-20). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the method of Goldstein by applying a series of forward and reverse current steps as disclosed by Brytczuk, because Brytczuk teaches that during the reverse current flow, the cathode anodizes and allows for easier removal of the deposited copper (see column 4, lines 1-5).

Regarding claims 29-30, Goldstein does not teach the period of time for which the current should be reversed. However, Brytczuk and that the time periods for both the forward and reverse current flow are result-effective variables (see column 3, lines 36-44 and column 6, lines 5-13). It would have been obvious to one of ordinary skill in the art at the time of the invention to optimize the time period of the reverse current flow in order to meet the requirements of the present invention. See MPEP 2144.05 IIB.

Regarding claims 32 and 34, Goldstein teaches that the dissolved metal is zinc oxide (column 2, lines 27-29).

Regarding claim 33, Goldstein teaches that the electrolyte solution is the product of a discharged zinc-air battery (column 2, lines 22-24).

Claims 22-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Goldstein *et al.* in view of Brytczuk *et al.* and Anderson *et al.* as applied to claim 21 above, and further in view of Siu *et al.*

Goldstein, Brtyczuk and Andersonteach the features as described above. However, Regarding claims 22 and 24, these references do not teach the claimed current densities in the cell. However, it would have been obvious to one of ordinary skill in the art at the time of the invention to optimize the current density of the electrolytic cell, because Siu teaches that the current density is a result-effective variable (column 7, lines 36-39). See MPEP 2144.05 IIB.

Regarding claim 23, Goldstein in view of Brytczuk and Anderson does not teach limiting the cell voltage to within 20% of the optimal voltage. However, it would have been obvious to one of ordinary skill in the art at the time of the invention to further

optimize the cell voltage because Siu teaches that the cell voltage is a result-effective variable (see column 7, lines 9-11) See MPEP 2144.05 IIB.

Claims 25-27 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Goldstein in view of Brytczuk and Anderson as applied to claim 21 above, and further in view of Landau (US Patent No. 6,261,433).

Goldstein, Brytczuk, and Anderson teach the features as previously described. However, regarding claims 25 and 26, these references do not teach monitoring the peak current through the electrolyzer and shutting off the power if the current exceeds an operating limit.

Landau teaches a method for electroplating a substrate in which the current is monitored and an alarm triggers the shutting down of the electrolyzer if the measured current is outside a preset operating range (column 8, lines 18-25). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the method of Goldstein in view of Brytczuk by incorporating a means to monitor the current and shut off the electrolyzer as disclosed by Landau, in order address the problem of unacceptably high resistances in the cell, as taught by Landau (column 8, lines 15-20).

Regarding claims 27 and 31, Goldstein teaches brushing the metal particles off the cathode surface (see column 2, lines 67-68), which would comprise a form of mechanical reconditioning. This step would inherently be carried out after shutting off the electrolyzer.

Regarding claim 35, the features of Goldstein and Brytczuk as applied to claims 9, 21 and 31 also apply to claim 35.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nira S. Birenbaum, Ph.D. whose telephone number is (571) 272-8516. The examiner can normally be reached on M-F 8:00 am - 4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on (571) 272-1244. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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